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Eating Disordered Behaviours in Portuguese athletes: The influence of personal, sport, and psychological variables

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Eating Disordered Behaviours in Portuguese athletes: The influence of personal, sport, and psychological variables

Abstract

Objective: This study describes eating disordered behaviours in a sample of Portuguese elite athletes and analyses the impact of personal and sports factors on those eating disordered behaviours.

Method: Two hundred and ninety athletes (51.7% males) practicing collective (64.8%) and individual sports have been included. The evaluation protocol included the *Eating Disorder Examination Questionnaire*; the *Sport Condition Questionnaire*; the *Sport Anxiety Scale*; the *Task and Ego Orientation in Sport Questionnaire*; the *Cognitive Evaluation of Sport–Threat Perceptions*; and the *Self-Presentation Exercise Questionnaire*.

Results: Females, athletes with a higher body mass index, and those with a desire to weigh less, reported more eating disordered behaviours. No relation with sports variables was found. Finally, a higher prevalence of eating disorders behaviour was predicted by lower satisfaction in terms of body shape and physical appearance, higher anxiety and impression motivation.

Conclusion: Personal characteristics of athletes, as well as their body satisfaction, anxiety, impression motivation and threat perception, and coach comments on their weight, represent dimensions that could raise the risk for eating disorders.

Keywords: Eating disorders; Psychological factors; Athletes

INTRODUCTION

Sport practice provides a positive experience for athletes due to its physical and psychological benefits (Biddle & Mutrie, 2001; Buckworth & Dishman, 2002). Yet, in some cases, sport can potentially increase the risk for eating disorders (Hausenblas & Carron, 1999; Smolak, Murnen, & Ruble, 2000). Some underlying reasons can explain this association. First, athletes are subject to significant socio-cultural pressure to conform to a lean body ideal as well as to an ideal body shape. Second, psychological characteristics exhibited by elite athletes, such as perfectionism, goal-orientation and concern with performance, are often described as risk factors for eating problems. Third, the onset of eating disorders occurs in adolescence and/or early adulthood, which coincides with the age range during which most athletes will be competing (Byrne & McLean, 2001).

The prevalence of eating disorders in different types of sports and athletes has been the subject of analysis in recent research. However, depending on the measures used, results are quite discrepant, ranging from low values, like 1% to 8% (Petrie, Greenleaf, Carter, & Reel, 2007; Reel, SooHoo, Doetsch, Carter, & Petrie, 2007; Sanford-Martens et al., 2005), up to 15% to 20% (Beals & Hill, 2006; Sundgot-Borgen, 1994a; Sundgot-Borgen & Torstveit, 2004). Given these conflicting results, it has been claimed that research should focus on identifying the psychological factors that are associated with eating disorders in athletes (Ferrand, Magnan, Rouveix, & Filaire, 2007; Petrie & Greenleaf, 2007). In fact, there is a need to pinpoint the individual characteristics that may be contributing for both successful athletic performance and problematic behaviours in sport, such as eating disordered ones (Thompson & Sherman, 1999). Additionally, it is imperative to appreciate if there are specific conditions in sport

contexts, such as coach pressure, that are related to a raised tendency for eating disorders.

In light of this, the present paper analyses the relationship between personal, sport and psychological variables, and eating disordered behaviours, in a sample of Portuguese athletes from a broad range of sports.

Concerning personal variables, it has been demonstrated that female athletes are at higher risk of suffering from eating disorders than their male counterparts (Haase, Prapavessis, & Owen, 2002; Hausenblas & McNally, 2004; Petrie, 1996; Yates, Edman, Crago, & Crowell, 2003). Likewise, athletes with lower body mass index (BMI) may be particularly prone to eating disorders (De Bruin, Karin, Oudejans, & Bakker, 2007; Petrie, 1996). Less evidence exists, however, on the impact of athletes' age or desire for ideal weight. Nevertheless, Di Bartolo and Shaffer (2002) found a negative correlation between the number of years competing at intercollegiate level (which does not coincide with athletes' age) and some eating disorder measures (e.g., "Eating Attitudes Test-26" and the "Eating Disorder Inventory-Body Dissatisfaction Subscale").

In terms of sport variables, some research demonstrates that there are more athletes with eating problems in sports which emphasize the need for thinness (e.g., ballet, gymnastics, long distance running) (Beals & Manore, 2000; Picard, 1999; Zucker, Womble, Williams, & Perrin, 1999). Conversely, there is very little evidence for the impact of competitive level. Even though investigators have been focusing on a broad range of competitive levels (e.g., college, club or local athletes), studies rarely included elite athletes, either competing at national or international level. However, the elite athletes have to deal with more pressure to conform to an ideal body shape than non-elite athletes (Byrne & McLean, 2001).

In relation to psychological factors, two sets of dimensions have been already studied: those related to sport psychology (e.g., threat perception, anxiety, goal orientation, self-presentation), and those analysed in eating disorders literature (e.g., satisfaction with body shape and physical appearance, and weight-related coach pressure). In relation to dimensions relevant for sport psychology, there is some support for the impact of threat perception on psychological and physical reactions of athletes (Rotella & Lerner, 1992). One of the most common emotional responses in athletes is anxiety, which has evident consequences on performance (Edwards & Hardy, 1996; Giacobbi & Weinberg, 2000). For example, Petrie et al. (2007) observed that athletes with a tendency for eating disorders reported higher values in a measure of negative affect (that includes also an item about anxiety) than athletes without those problems. Likewise, Holm-Denoma, Scaringi, Gordon, Van Orden and Joiner Jr. (2009) concluded that higher levels of anxiety predicted symptoms of bulimia and the desire for being thin. Despite these indications, it is difficult to establish the impact of threat perception and emotions (including anxiety) on the development of eating disorders in athletes. In the case of goal orientation, there is empirical evidence of the impact on athletes' psychological reactions to sport experiences (e.g., self-confidence, satisfaction, fun, sport commitment, anxiety) (Chi, 2004; Roberts, 2001; Walling, Duda, & Chi, 1993). In one of the few studies done about the relationship with eating behaviours, De Bruin Karin, Bakker, and Oudejans (2009) indicated that a stronger ego orientation in female gymnasts and dancers was related to more dieting, weight-related peer pressure, perfectionism and lower self-esteem. Finally, self-presentation, i.e., the processes used to control the way a person is seen by others (Leary, 1994), may also play an important role in sport, affecting the motivation for exercise, the type of activity in which people

choose to engage in, or where and with whom they exercise (Leary, 1992). Even though there are not many studies about self-presentation in sport contexts, there is some evidence that this variable may have an important role in eating behaviours, mainly on females with a higher need for social approval and for being perceived as feminine (see Mori, Chaiken, & Pliner, 1987; Pliner & Chaiken, 1990).

In terms of the dimensions related with eating disorders literature, there is evidence that athletes, particularly females, tend to feel dissatisfaction when they sense a discrepancy between the way they perceive themselves and the way others evaluate their bodies (Stice, Chase, Stormer, & Appel, 2001). For instance, athletes with eating disorders reported greater fear of becoming fat, and their self-esteem was influenced by their weight (Petrie et al., 2007). Therefore, it makes sense to analyse the impact of body satisfaction on eating disorders, due the possible adoption of dietary behaviours and eating restrictions (Smith & Petrie, 2008). In addition, there are indications that athletes with eating disorders, particularly those with anorexia nervosa, exhibit a higher tendency for conformism and a higher need for social approval (Garfinkel & Garner, 1982). In fact, these athletes present more willingness to please others, combined with a fear of disappointing significant persons, such as their coach (Jones, Glimtmeier, & McKenzie, 2005; Thompson & Sherman, 1999). In turn, coaches tend to overlook any problem related with eating, rarely detecting a case of possible eating disorder. This aspect is also interesting because there is a tendency for coaches to attribute the use of unhealthy weight control practices to other coaches but not to themselves (Kerr, Berman, & De Souza, 2006). Thus, it is essential to determine whether coaches can promote risk behaviours in terms of eating, given the type of comments and

expectations they set for athletes' physical appearance and shape (Biesecker & Martz, 1999).

Taking into account these empirical findings, the aims of this study are threefold. First, to analyse the potential links between personal and sport characteristics of athletes (e.g., gender, age, BMI, desire for ideal weight, type of sport and competitive records) and eating disordered behaviours. Second, to investigate the relationship between athletes' eating behaviours and psychological dimensions (e.g., threat perception, anxiety, goal orientation, self-presentation, satisfaction with body shape and physical appearance and weight-related coach pressure). Finally, to explore the influence of psychological variables in athletes' eating disordered behaviours, after controlling for relevant socio-demographic and sport characteristics.

METHOD

Participants

Two hundred and ninety athletes (150 males, 51.7%) between 14 and 30 years of age ($M=17.8$; $SD=3.49$) were recruited for this study. Over a third compete in their sport's top division ($n=111$, 38.3%), and the remaining were competing in lower divisions, namely at a regional or national levels. One hundred and two (35.2%) practiced an individual sport (athletics, karate, swimming, and taekwondo), whereas 188 (64.8%) were involved in collective sports (basketball, handball and volleyball). About a third of the participants ($n=82$, 28.3%) had already won a national title and 6.6% of participants ($n=19$) achieved the same registration at an international level. All athletes were asked to report their weight and height so that BMI could be calculated. Three

athletes (1.0%) did not report their height and weight, and two others (0.6%) did not provide information on their weight. Therefore, BMI was computed for 285 participants (98.3% of the total sample). The BMI varied between 17.42 and 33.95 ($M=21.94$, $SD=2.62$). The vast majority of the sample ($n=240$, 82.2%) had normal weight, 11 athletes (3.8%) were underweight ($BMI<18.5$), and the remaining 34 athletes (11.7%) were overweight ($BMI\geq 25$). About half the sample ($n=149$, 51.4%) expressed a desire for an ideal weight lower than their current one.

Measures

Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Portuguese translation by Machado, 2007).

This instrument is a self-report version of the *Eating Disorder Examination*, a well-established investigator-based interview (Fairburn & Cooper, 1993). In this study, we used version 6.0 (Fairburn & Beglin, 2008), whose psychometric properties and norms have already been assessed in a sample of 4091 high school and college Portuguese students (Machado & Martins, 2010). This version is comprised of 28 items answered on a seven-point *Likert*-scale ranging from 0 (“None”) to 6 (“Every day”). The EDE-Q provides four subscales reflecting the severity of aspects of the psychopathology of eating disorders occurred in the past 28 days, namely: i) Restraint (five items; $\alpha=.75$), assessing behaviours related to avoidance of food and the rules followed in diets and feeding (e.g., avoidance of eating); ii) Eating concern (five items; $\alpha=.69$), focusing on the fear of losing control over food and apprehension about what to eat (e.g., eating in secret); iii) Shape concern (eight items; $\alpha=.90$), measuring feelings of dissatisfaction with body shape, body exposure in public situations and emphasis on

physical fitness (e.g., avoidance of exposure); and iv) Weight concern (four items; $\alpha=.82$), directed at feelings of dissatisfaction with current weight and the need to maintain or achieve a certain body weight (e.g., desire to lose weight). Subscale scores were obtained by adding item scores and the sum was divided by the total number of items forming each subscale. It was also possible to calculate a global score, which resulted from the average of the four subscale scores ($\alpha=.94$). It should be mentioned that, as far as we know, this questionnaire has never been used with Portuguese athletes, so we used the same criteria proposed in other studies (see Luce & Crowther, 1999; Luce, Crowther, & Pole, 2008), calculating the reliability coefficients of the several subscales of the instrument.

Cognitive Evaluation of Sport-Threat Perception (CES-TP; Cruz, 1996).

This instrument has been already used with Portuguese athletes (Cruz, 1996) and was developed following Lazarus' transactional approach (Lazarus, 1991; Lazarus & Folkman, 1984). Lazarus and Folkman (1984) proposed that it is the individual's appraisal of the situational relevance to well-being, rather than the situation itself, that potentially leads to stress. In primary appraisal, the individual evaluates the personal significance of a situation with regard to his/her values, personal beliefs, situational intentions and goal commitments. In secondary appraisal, the individual analyses what can be done about a stressful person-environment relationship, especially if the primary appraisal results in a sense of harm/loss or threat (Lazarus, 1999). The CES-TP is comprised of eight items, measured in a five-point *Likert*-scale ranging from 1 ("It doesn't apply to me") to 5 ("It applies to me") and assesses primary cognitive appraisal in terms of threat perceptions of athletes about competition (e.g., failing or making

mistakes at crucial moments in competition). In other words it analyses “what is at stake” in competition for each athlete and which can cause stress. The score was obtained by summing the scores on the eight items ($\alpha=.88$).

Sport Anxiety Scale (SAS-2; Smith, Smoll, Cumming, & Grossbard, 2006; Portuguese adaptation by Cruz & Gomes, 2007).

This instrument is now being used with Portuguese athletes, replacing the original version of the scale proposed by Smith, Smoll, and Schutz (1985), that presents some problems with the factorial structure. So, SAS-2 is a multidimensional measure of sport performance anxiety of 15 items answered on a four-point *Likert*-scale ranging from 1 (“Not at all”) to 4 (“Very much”), which assesses both cognitive (in terms of worry and concentration disruption in competition) and somatic trait anxiety (physical reactions of anxiety). It comprises three subscales: i) Somatic anxiety (five items; $\alpha=.85$), involving indices of autonomic arousal centered in the stomach and muscles (e.g., “My body feels tense”); ii) Worry (five items; $\alpha=.88$), concerning performing poorly and the resulting negative consequences (e.g., “I worry that I will not play well”); iii) Concentration disruption (five items; $\alpha=.82$), reflects the difficulties in concentrating on task-relevant activities (e.g., “I lose focus on the game”). Subscale scores were obtained by summing the scores on each scale. It was also possible to calculate a global score which resulted from the sum of the three subscale scores ($\alpha=.89$).

Task and Ego Orientation in Sport Questionnaire (TEOSQ; Duda, 1992; Duda & Whitehead, 1998; Portuguese adaptation by Cruz & Matos, 1997).

This instrument was already used with Portuguese athletes (Cruz & Matos 1997) and was designed to assess individual differences in the tendency for task and ego involvement, as defined in Nicholls theory (1984, 1989). It comprises 13 items answered on a five-point *Likert*-scale ranging from 1 (“Strongly disagree”) to 5 (“Strongly agree”), and assesses two dimensions: i) Ego orientation (six items; $\alpha=.87$), involving the purposes of demonstrating superior ability to others, being achievement construed in norm referenced terms (e.g., “I feel successful in sport when the others can’t do as well as me”); ii) Task orientation (seven items; $\alpha=.85$), assessing the purposes of gaining skill or knowledge and performing at one’s best (e.g., “I feel successful in sport when I work really hard”). Subscale scores were obtained by adding item scores and the sum was divided by the total number of items forming each scale.

Self-Presentation Exercise Questionnaire (SPEQ; Gammage et al., 2004; Portuguese adaptation by Cruz, 2006).

This instrument is being used in sport and exercise contexts (Cruz, 2006) and comprises eight items answered on a six-point *Likert*-scale ranging from 1 (“Strongly disagree”) to 6 (“Totally agree”). It assesses self-presentational processes in two personal dimensions: i) Impression construction (four items; $\alpha=.86$), representing the individual’s behaviours to create the impression of being fit, toned and as an exerciser (e.g., “I want others to see me with friends who are exercising”); ii) Impression motivation (four items; $\alpha=.82$), representing an individual’s desire to be perceived as being fit, toned or as an exerciser (e.g., “I try to appear toned of fit to others”). Subscale scores were obtained by adding item scores and the sum was divided by the total number of items forming each subscale.

Sport Condition Questionnaire (SCQ).

This questionnaire was designed for the purpose of this study and is comprised of seven items answered on a five-point *Likert*-scale, ranging from 1 (“Strongly disagree”) to 5 (“Totally agree”), which are organised into two subscales. The items for these subscales were based on Bruin, Oudejans and Bakker (2007) study with Dutch female gymnasts and non-aesthetic sport participants, and we selected similar items from the original “weight-related causal attributions of success and failure” (e.g., weight, body shape and physical appearance) and “weight-related coach pressure” (e.g., remarks about weight, judging on appearance, urging to diet, and attribution failure to weight). The most significant aspect in this adaptation was the fact that we used the items from the original “weight-related causal attributions of success and failure” to measure athletes’ satisfaction and not to analyse causal attribution. The “weight-related coach pressure” was maintained very similar to Bruin, Oudejans and Bakker (2007) measure. Therefore, the SCQ evaluates two dimensions: i) Satisfaction with body shape and physical appearance (three items; $\alpha=.81$) (e.g., “I am satisfied with my weight”); and ii) Weight-related coach pressure (four items; $\alpha=.81$) (e.g., “My coach claims that it is urgent for me to diet”). Subscale scores were obtained by adding item scores and the sum was divided by the total number of items forming each subscale.

Procedure

An initial request explaining the research goals and the data collection procedures was sent to the coaches. Next, athletes were invited to participate in the study with the guarantee that their data was anonymous and confidential. Then, they signed an

informed consent and, in the case of young athletes (less than 18 years of age), their parents/guardians signed the consent.

Data collection occurred before or after a training session, during the days preceding competition. Coaches were not present while the athletes completed the assessment protocol. The return rate of the assessment protocol was 80.3%.

Data analysis

Initial exploratory data analysis was carried out revealing that for the majority of variables the assumptions for using parametric tests were met. For those where this was not the case, we used the strategy of computing both parametric and their equivalent non-parametric tests, as advised by Fife-Schaw (2006). Given the conclusions drawn from both set of tests were the same in all cases, we opted for presenting the parametric tests' results, as these are more robust and allow us to use multivariate analysis reducing the number of tests carried out and, therefore, the probability of the Type I error.

First, univariate analysis was carried out in order to examine how athletes' socio-demographic, sport and psychological characteristics were related to their eating disordered behaviours. Thus, the results section begins by presenting two-tailed correlations for assessing the associations between eating disordered behaviours and gender, age, BMI and athletes' ideal weight. Second, the effect of the type of sport and titles on the athletes' eating disordered behaviour was investigated using two-way ANOVAs. Finally, two-tailed correlations were carried out to check for association between eating disordered behaviours and psychological variables. The results section ends with a regression analysis with blocked entry procedures, so as to examine the

influence of the psychological variables in the athletes' eating disordered behaviour, having taken into account relevant socio-demographic and sports' characteristics.

RESULTS

Relationship between eating disorder behaviours and athletes' personal and sports' characteristics

Starting with the descriptive measures for the EDE-Q subscales and global score, these all fall below the subscales midpoint (Restraint, $M = .82$, $SD = 1.07$; Eating Concern, $M = .41$, $SD = .69$, Shape Concern, $M = 1.08$, $SD = 1.29$; Weight Concern, $M = 1.20$, $SD = 1.44$; EDE-Q Global Score $M = .89$, $SD = 1.01$).

Taking into account clinical criteria defined for EDE-Q (Luce et al., 2008; Mond, Hay, Rodgers, & Owen, 2006), we did not find any athletes with symptoms of clinical eating disorders in the four subscales of EDE-Q.

Table 1 displays the correlations between the athletes' eating disorder behaviour and their gender, age, BMI and desire for ideal weight.

Table 1
Correlations between athletes' eating disorder behaviour and their gender, age, BMI, and ideal weight

	Restraint	Eating Concern	Shape concern	Weight Concern	EDE-Q Global Score
Gender^a	.23***	.16**	.39***	.36***	.34***
Age	.04	-.04	-.02	-.02	-.01
BMI	.23***	.18**	.17**	.25***	.24***
Ideal Weight^a	.45***	.34***	.46***	.52***	.51***

^a Point-biserial correlation coefficient

*** $p < .001$; ** $p < .01$

No associations were found between the athletes' age and each EDE-Q subscale or Global Score. However, the participants' gender, their BMI and desire for an ideal weight lower than the current one were positively related to each EDE-Q dimension, as well as the Global Score. Therefore, more eating disordered behaviours are associated with females and athletes with higher BMIs and/or with a desire for an ideal weight lower than their current one.

Effect of type of sport and titles on the athletes' eating disordered behaviour

A two-way ANOVA revealed no main effect of either type of sport ($F(1, 283)=.17$, n.s.) or having or not won national titles ($F(1, 283)=.06$, n.s.). No interaction effect was found either ($F(1, 283)=.67$, n.s.).

Likewise, no main effect of type of sport ($F(1, 283)=.52$, n.s.) or having or not won international titles ($F(1, 283)=.001$, n.s.) were found on the athletes' eating disordered behaviour. No interaction effect was found ($F(1, 283)=.18$, n.s.).

Associations among athletes' eating disordered behaviour and psychological dimensions

When examining the associations between the participants' eating disordered behaviour and the assessed psychological dimensions (Table 2), we found that more eating disturbed behaviour was associated with higher coach pressure regarding athletes' weight and lower satisfaction with body shape and physical appearance. In addition, higher scores on the EDE-Q global score were linked with higher anxiety, higher impression for motivation and higher threat perception. Finally, a marginally significant positive correlation was found between eating disorder and task orientation.

Table 2

Correlations between athletes' eating disorder behaviour and psychological dimensions

	WRCP	SBSPA	ANX	TO	EO	IM	IC	TP
EDE-Q Global Score	.26***	-.58***	.36***	.10 ⁺	.08	.21***	.096	.33***

WRCP – Weight-Related Coach Pressure (SCQ); **SBSPA** – Satisfaction with Body Shape and Physical Appearance; (SCQ); **ANX** – Anxiety Global Score (SAS-2); **TO** – Task Orientation (TEOSQ); **EO** – Ego Orientation (TEOSQ); **IM** – Impression Motivation (SPEQ); **IC** – Impression Construction (SPEQ); **TP** – Threat Perceptions (CES-TP)

*** $p < .001$; ** $p < .01$; + $p < .10$

Prediction of athletes' eating disordered behaviour

In order to examine whether, and how, athletes' characteristics account for variations in their eating disordered behaviour, a regression analysis with blocked entry procedures was performed (Table 3). In the first block, we have inserted the only socio-demographic variable with a significant association with the EDE-Q (gender). In the second block, the BMI and ideal weight were included. In the third and final block we have inserted all psychological variables previously found to be significantly associated with the athletes' eating disordered behaviour. This strategy allowed us to assess the relationship between the psychological dimensions and eating disordered behaviour, while controlling for the athletes' gender, and BMI and ideal weight. Four outliers were identified and therefore excluded from the analysis.

The first block containing the participants' gender was found to be significant explaining 18% of the variance. Female athletes report higher eating disordered behaviour than males. When BMI and ideal weight were added to the regression in the second block, the model accounted for 37% of the variance and was found to be statistically significant. Whereas higher BMI was not significantly associated with higher eating disordered behaviour (differences were marginally significantly at $p < .10$),

desiring an ideal weight lower than the current one was found to be a significant predictor of eating disorders. The inclusion of the psychological dimensions in the third block resulted in a significant model accounting for 60% of the variance. Thus, after taking into account the effects of gender, BMI, and ideal weight, the athletes' satisfaction with body shape and physical appearance, anxiety and impression motivation emerged as significant predictors. Thus, higher eating disorders behaviour was predicted by lower satisfaction in terms of body shape and physical appearance, higher anxiety and higher impression motivation.

Table 3
Regression model for the prediction of athletes' eating disordered behaviour

Block 1 – Gender	R² (Adjusted R²)	F(1, 249)	β	t
Gender ^a	.18 (.18)	55.07***	.43	7.42***
Block 2 – BMI and Ideal Weight	R² (Adjusted R²)	F(3, 247)	β	t
BMI			.11	1.77 ⁺
Ideal Weight ^b	.37 (.36)	48.26***	.39	6.47***
Block 3 – Psychological dimensions	R² (Adjusted R²)	F(8, 242)	β	t
Weight-Related Coach Pressure (SCQ)			.06	1.47
Satisfaction with Body Shape and Physical Appearance (SCQ)			-.37	-7.89***
Anxiety Global Score (SAS-2)	.60 (.59)	45.77***	.22	4.68***
Impression Motivation (SPEQ)			.15	3.43***
Threat Perception (CES-TP)			.02	.43

^a **Gender:** 0-Male; 1-Female; ^b **Ideal Weight:** 0-Same or higher than current weight; 1-Lower than the current weight;

*** $p < .001$; ⁺ $p < .10$

DISCUSSION

The main result of this study show some personal and sport variables as being related with athletes' eating disordered behaviour (e.g., gender, BMI, and desire for ideal weight). Additionally, some psychological dimensions have an impact on eating

problems (e.g., athletes' satisfaction with body shape and physical appearance, anxiety and impression motivation) while others did not produce the same effect (e.g., weight-related coach pressure and threat perception).

The impact of gender, BMI and ideal weight on eating disordered behaviours was evident in our sample. Thus, eating disordered behaviours were more pronounced among females, in athletes with a higher BMI and in those with a desire for an ideal weight lower than their current one. The association with gender is in line with the results of previous research (Hausenblas & McNally, 2004; Sanford-Martens et al., 2005). As for the BMI, which is one of the most reliable and clinically relevant measures (Miller, 1996), we found that as athletes get more weight than the expected for their height, eating disordered behaviours increase. This result is very important if we take into account empirical data that emphasize BMI as a strong predictor of eating disorders (Davis & Cowles, 1989), and an independent measure of bulimic symptomatology (Lester & Petrie, 1995). In addition to BMI, the desire for ideal weight also emphasizes the fact that athletes with the desire for less weight exhibited a higher tendency for eating disordered behaviours. It is worth noting that about half of our sample expressed a desire to weigh less (51.4%), when 82.2% had normal weight. Thus, for the majority of the participants, this desire to weigh less did not have a relation with their current weight. The importance of athletes' desires about their weight has been reported in some studies, indicating that athletes who perceive themselves as overweight (even if they are not) may try to lose weight (Grieve, Wann, Hensen, & Ford, 2006), experience body dissatisfaction and worry about others' evaluation (Ferrand et al., 2007; Harris & Foltz, 1999). In sum, both factors, one physical (BMI)

and another one psychological (desire for ideal weight) represent important factors for understanding the observed eating disordered behaviours in this sample.

With respect to sport variables, two aspects justify being highlighted. The first relates to the type of sport practiced. This study included both athletes on individual sports, which are more dependent on a restrict body weight (“lean or weight sports”) (e.g., athletics, karate, swimming, taekwondo), and athletes of collective sports, where this condition is not so critical for their performance (“non-lean sports”) (e.g., basketball, handball and volleyball) (Byrne & McLean, 2001; Ferrand et al., 2007). This distinction, however, did not show any effect on the athletes’ eating disordered behaviours. Even though this result contrasts with some empirical findings (Beals, 2004; Davis & Cowles, 1989; Sundgot-Borgen, 1994b; Zucker et al., 1999), it is in line with other results of non-differences between type of sports (Hausenblas & McNally, 2004; Sanford-Martens et al., 2005). The second aspect has to do with sport performance. In our case, we discriminated between the athletes who achieved maximum results at a national and/or international level (elite athletes) and those who did not achieve that level. The relevance of this comparison is related to the suggestion that as competitive level increases, athletes may face more intense training and greater pressure to maintain a specific weight (Sundgot-Borgen, 1994a). Unfortunately, research data is mixed. Whereas some studies found support for this hypothesis (Picard, 1999; Stoutjesdyk & Jevne, 1993), others failed to do so (Harris & Greco, 1990; Hausenblas & Carron, 1999). Perhaps one of the factors that can contribute for this empirical incongruence is the selection of athletes for the comparison groups - athletes that *compete* at a higher level versus athletes that *achieve* maximum performance on competitive settings. We selected the latter and did not find any differences between

groups on their eating disordered behaviours. However, this propensity should be explored in future research, as there are indications that elite athletes may be at particular risk for eating disorders (Hamilton, Brooks-Gunn, & Warren, 1986; Szmukler, Eisler, Gilles, & Hayward, 1985; Weigh & Noakes, 1987).

In the third analysis, we focused on the relationship between eating disordered behaviours and psychological factors. In our study, the EDE-Q global score was positively associated with weight-related coach pressure, anxiety, task orientation (marginally significant), impression motivation and threat perception, and negatively associated with less satisfaction with body shape and physical appearance. However, after controlling for the effects of gender and desire for an ideal weight, eating disordered behaviour was predicted by lower satisfaction with body shape and physical appearance, and higher anxiety and impression motivation. Before analysing significant variables in predicting eating disordered behaviour, we should stress the impact of weight-related coach pressure. In fact, these behaviours assumed by coaches were positively associated with a higher tendency for eating problems in athletes, results consistent with previous investigations. For instance, Muscat and Long (2008) showed that female athletes and sport participants who received critical comments about weight and body shape from their coach reported greater disordered eating symptoms.

Our study also highlights the impact of some psychological factors on eating disorders and suggests the advantages of analysing those aspects for a better understanding of eating risk behaviours on sport (Petrie et al, 2007). Thus, psychological characteristics related with trait anxiety, body satisfaction and the individual desire for being perceived as fit, toned or as an exerciser, might represent the main factors that better explain athletes' eating disordered behaviours. Investigation of

this specific topic is scarce. However, the relationship between eating problems and anxiety and body satisfaction has been supported by other studies. For example, Holm-Denoma et al. (2009) found that higher levels of sport anxiety predicted more bulimic symptoms and drive for thinness in female athletes. Likewise, Haase and Prapavessis (2001) found that social physique anxiety predicted 21% of the variance in eating-disordered attitudes and behaviours of female athletes and non-athletes. With respect to personal satisfaction, Ferrand et al. (2007), in a study with elite synchronized swimmers, found that body-esteem satisfaction explained dietary restraint and the relationship between these two variables was negative. Finally, regarding self-presentation, it is more difficult to integrate our findings in the literature as the studies that examined the association between athletes' desired impressions and their health-related behaviour are even more scarce (Ginis & Leary, 2004). However, we confirmed anecdotal evidence that athletes can also take risk eating behaviours in an attempt to give a positive and favourable image of themselves.

The current study has some limitations. First, data was based on athletes' self-report, which could have resulted in underreporting of eating disordered behaviours. We tried to control for this potential bias by assuring anonymity and individual filling of the assessment protocol. Still, these procedures do not guarantee accuracy. Second, future work should include objective measures of height and weight, as relying on the participants' self-report might introduce undesirable bias in BMI calculation (DiBartolo & Shaffer, 2002). Third, a better discrimination between sports according to their requirements (e.g., technical, endurance, aesthetic, weight dependent, ball game, and power sports) needs to be introduced (Byrne & Mclean, 2001) in order to better differentiate the demands and specific characteristics of each sport. Finally, it is vital to

further explore the impact of psychological factors on eating disordered behaviours. For example, it became clear that impression motivation was positively associated with eating disordered behaviours. And, in the same way there was a trend to this type of association in what concerns task orientation. However, these dimensions have also been related with positive adaptation to sport in the case of task orientation (Chi, 2004) and health-damaging behaviours, such as drinking, in the case of impression motivation (Ginis & Leary, 2004). The real impact of these and others psychological dimensions should be analysed in future research.

The main implication of this study is the fact that coaches and athletic departments should be aware that some athletes' personal characteristics can put them at a higher risk of suffering from eating disorder symptoms. This is valid for gender, the desire for ideal weight and BMI. In this last case, it is interesting to note that weight could not be the better indicator of athletes' tendency for eating problems (e.g., about 80% of the athletes in this study had a normal weight according BMI). But if we take a look at the desirable weight then the results are somewhat different. Athletes who perceived themselves as overweight have a higher tendency for engaging in eating disordered behaviours. In a practical way, more than paying attention to athletes' weight and height as potential risks factors for problematic eating behaviours, it is imperative to discuss their personal evaluation of their body and shape. If there are significant discrepancies between the current situation and what they want to be then it might be a good idea to implement prevention strategies for eating disorders. On the other hand, body satisfaction, anxiety and impression motivation represent important dimensions that could raise the risk for eating disorders. Again, it is important to assess athletes' reactions in competition (e.g., what makes them feel anxiety and increases threat

perception?), the way they perceive themselves (e.g., what makes them feel unsatisfied with the way they look?), and the way they want others to perceive them (e.g., why and who are they trying to please?). If there is a better comprehension of these factors, then prevention of eating problems and promotion of better experiences in sport becomes easier to achieve.

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